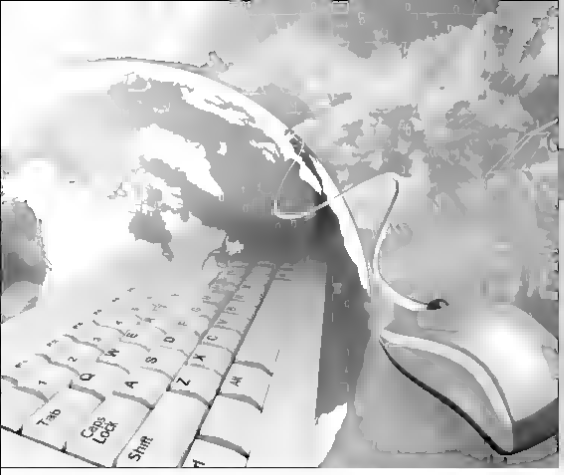

CHAPTER 4

Introduction to Internet

4. Introduction to Internet

4.1 History

In its infancy, the Internet was originally conceived by the Department of Defence, USA as a way to protect government communications systems in the event of a military strike The original network, dubbed ARPANet (for the Advanced Research Projects Agency that developed it) evolved into a communications channel among contractors, military personnel, and university researchers who were contributing to ARPA projects

The network employed a set of standard protocols to create an effective way for these people to communicate and share data with each other. In the 1980's the National Science Foundation, whose NSFNet, linked several high speed computers, took charge of the what had come to be known as the Internet

By the late 1980's, thousands of cooperating networks were participating in the Internet In 1991, the U S High Performance Computing Act established the NREN (National Research & Education Network). NREN's goal was to develop and maintain high-speed networks for research and education, and to investigate commercial uses for the Internet

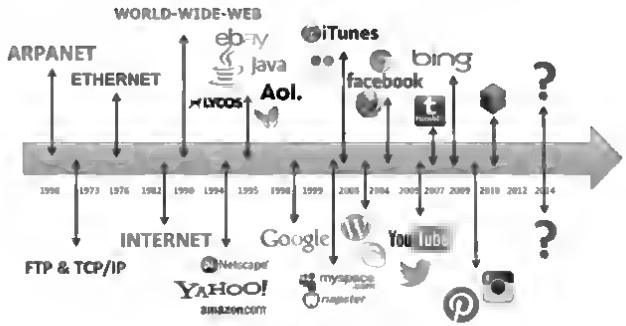

Figure 4.1 – History of Internet

The popular name for the Internet is the information superhighway. Whether you want to find the latest financial news, browse through library catalogs, exchange information with colleagues, or join in a lively political debate, the Internet is the tool that will take you beyond telephones, faxes, and isolated computers to a burgeoning networked information frontier.

4.2 Internet

Internet is a global computer network providing a variety of information and communication facilities, consisting of interconnected networks using standardized communication protocols. The connected computers belong to various agencies – government, universities, companies, individuals etc. Most of the Internet Services operate on the client / server model. A computer is a client if it is receiving files, and is a server if it is sending files. To gain access to the Internet most people open an account with an Internet Service Provider (ISP) in their areas.

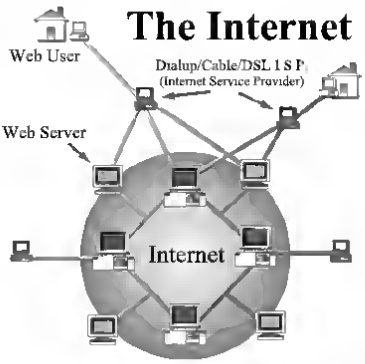

Figure 4.2– Internet

4.2.1 Uses of Internet

4.2.1.1 Communication

At the moment the easiest thing that can be done using the internet is that we can communicate with the people living far away from us with extreme ease. Earlier the communication used to be a daunting task but all that changed once internet came into the life of the common people. Now people can not only chat but can also do the video conferencing. Communication is the most important gift that the internet has given to all of us. Email, social networking sites are some of the prime example of it.

4.2.1.2 Research

In order to do research one needs to go through hundreds of books as well as the references and that was one of the most difficult jobs to do earlier. Since the Internet came into life, everything is available just a click away. You just have to search for the concerned topic and you will get hundreds of references that may be beneficial for your research. You can also benefit a large amount of people from your research work by making it public on the Internet.

4.2.1.3 Education

Education is one of the best things that the internet can provide. There are a number of books,

reference books, online help centers, expert's views and other study oriented material on the internet that can make the learning process very easy as well as a fun learning experience.

4.2.1.4 Financial Transaction

Financial transaction is the term which is used when there is exchange of money. With the use of internet in the financial transaction, your work has become a lot easier. Now you don't need to stand in the queue at the branch of your particular bank rather you can just log in on to the bank website with the credential that has been provided to you by the bank and then can do any transaction related to finance at your will. With the ability to do the financial transaction easily over the internet you can purchase or sell financial products easily.

4.2.1.5 Real Time Updates

Internet provides you the ability to connect with latest happenings and real time updates at any point of time. There are various websites on the internet which provides you with the real time updates in every field be it in business, sports, finance, politics, entertainment and others.

USEFUL TIP

Internet is an information super highway which finds use in almost all the industry fields. It is a key skill for Digital Literacy which helps us connect to the online world.

QUICK REVIEW

- How does Internet help in searching information?
- How can Internet help in doing School Project work?
- What is the use of Internet in field of distance education?

4.3 World Wide Web

The World Wide Web (WWW) is an open source information space where documents and other web resources are identified by URLs, interlinked by hypertext links, and can be accessed via the Internet. The World Wide Web was central to the development of the Information Age and is the primary tool billions of people use to interact on the Internet. Individual document pages on the World Wide Web are called web pages and are accessed with a software application running on the user's computer, commonly called a web browser. Web pages may contain text, images, videos, and other multimedia components, as well as web navigation features consisting of hyperlinks.

The Internet & the World Wide Web (the Web), are used interchangeably but they are not synonymous. Internet can be termed as hardware part - it is a collection of computer networks connected through either copper wires, fiber-optic cables or wireless connections whereas, the World Wide Web can be termed as the software part – it is a collection of web pages connected

through hyperlinks and URLs. World Wide Web is one of the services provided by the Internet. Other services over the Internet include E-mail, chat, blogging and file transfer services are examples of services over the Internet.

4.4 Browser

A browser is a software application used to locate, retrieve and display content on the World Wide Web, including Web pages, images, video and other files. As a client/server model, the browser is the client run on a computer that contacts the Web server and requests information. The Web server sends the information back to the Web browser which displays the results on the computer or other Internet-enabled device that supports a browser.

Today's browsers are fully functional software suites that can interpret and display HTML Web pages, applications, JavaScript and other content hosted on Web servers. Web browsers consist of a user interface, layout engine, rendering engine, JavaScript interpreter, UI backend, networking component and data persistence component.

Most major web browsers have these user interface elements in common though names can be different -

- Back and forward buttons to go back to the previous resource and forward respectively.
- A refresh or reload button to reload the current resource.
- A stop button to cancel loading the resource. In some browsers, the stop button is merged with the reload button.
- A home button to return to the user's home page.
- An address bar to input the Uniform Resource Identifier (URI) of the desired resource and display it.
- A search bar to input terms into a search engine. In some browsers, the search bar is merged with the address bar.

Figure 4.3– Browsers

- A status bar to display progress in loading the resource and also the URI of links when the cursor hovers over them, and page zooming capability.
- The viewport, the visible area of the webpage within the browser window.
- The ability to view the HTML source for a page.
- Major browsers also possess incremental find features to search within a web page.
- Most browsers support HTTP Secure and offer quick and easy ways to delete the web cache, download history, form and search history, cookies, and browsing history.

The two most popular browsers are Microsoft Internet Explorer / Microsoft Edge and Google

Chrome. Other major browsers include Firefox, Apple Safari and Opera

USEFUL TIP

It is highly advised to make Chrome Browser set as default browser as it is much more convenient due to seamless integration with other Google based services

4.5 Website

A Web site is a related collection of World Wide Web (WWW) files that includes a beginning file called a home page. A company or an individual tells you how to get to their Web site by giving you the address of their home page. From the home page, you can get to all the other pages on their site.

Figure 4.4– Websites

Websites have many functions and can be used in various fashions; a website can be a personal website, a commercial website, a government website or a non-profit organization website. Websites can be the work of an individual, a business or other organization, and are typically dedicated to a particular topic or purpose. Any website can contain a hyperlink to any other website, so the distinction between individual sites, as perceived by the user, can be blurred.

Web pages can be viewed or otherwise accessed from a range of computer-based and Internet-enabled devices of various sizes, including desktop computers, laptops, PDAs and cell phones. A website is hosted on a computer system known as a web server, also called a HTTP server.

Websites can be divided into two broad categories - **Static and Dynamic**. Static sites serve or capture information but do not allow engagement with the audience directly. Dynamic sites are part of the Web 2.0 community of sites, and allow for interactivity between the site owner and site visitors.

USEFUL TIP

Nowadays most of the corporate websites are dynamic in nature which help in better customer engagement and accurate tracking of consumer behavior.

QUICK REVIEW

- Name some websites to access News?
- What are the types of Website?
- What is the advantage of Interactive websites over Static websites?

4.6 Uniform Resource Locator

A Uniform Resource Locator (URL) (commonly referred to as a web address) is a reference to a web resource that specifies its location on a computer network and a mechanism for retrieving it URLs occur most commonly to reference web pages (http), but are also used for file transfer (ftp), email (mailto), database access (JDBC), and many other applications Most web browsers display the URL of a web page above the page in an address bar.

Figure 4.5– URL

URL is an internet address of a website, file, or document in the general format

http://www.address/directories/file name

Every computer connected to the internet has its unique URL without which it cannot be reached by other computers In other words a typical URL could have the form

http://www.example.com/index.html

This indicates a protocol (http), a hostname (www.example.com), and a file name (index.html) Few examples of TLDs (Top Level Domains) are shared below for reference

HTTP & HTTPS:

HTTP (Hyper Text Transfer Protocol) is an application protocol for distributed, collaborative, hypermedia information systems. HTTP is the foundation of data communication for World Wide Web. Hyper Text is structured text that uses logical links (hyperlinks) between nodes containing text. HTTP is the protocol to exchange or transfer hypertext. HTTP functions as a request-response protocol in the client server computing model

ZONE	DEFINITION	FOR USE BY
com	Commercial	Business
edu	Education	Universities
gov	Government	U S federal government agencies
int	International	Organizations established by international treaties
mil	Military	U S military
net	Network	Network providers administrator computer network node computer
org	Organization	Non profit and miscellaneous organizations

Figure 4.6– Top Level Domains

Protocol for secure communication over a computer network using HTTP is HTTPS (HTTP Secure). HTTPS consists of communication over HTTP within a connection encrypted by Transport layer security or its predecessor, Secure Sockets Layer The main motivation for HTTPs is authentication of the visited website and protection of the privacy and integrity of exchanged data. This is widely used on the internet especially websites that use financial transactions / privacy data use HTTPS

USEFUL TIP

URL is a unique address that helps us locate a specific item on the web.

QUICK REVIEW

- What are the various components of a URL?
- How can you find a file in web directory using URL?
- What is the difference between .com & .edu top level domains?

4.7 Domain Name System

The domain name system (DNS) is the way that Internet domain names are located and translated into Internet Protocol addresses. A domain name is a meaningful and easy-to-remember "handle" for an Internet address.

The Domain Name System (DNS) is a hierarchical distributed naming system for computers, services, or any resource connected to the Internet or a private network. Most prominently, it translates domain names, which can be easily memorized by humans, to the numerical IP addresses needed for the purpose of computer services and devices worldwide.

The Domain Name System is an essential component of the functionality of most Internet services because it is the Internet's primary directory service. DNS is an Internet service that translates domain names into IP addresses. Because domain names are alphabetic, they're easier to remember. The Internet however, is really based on IP addresses. Every time you use a domain name, therefore, a DNS service must translate the name into the corresponding IP address. For example, the domain name www.example.com might translate to 198.105.232.4.

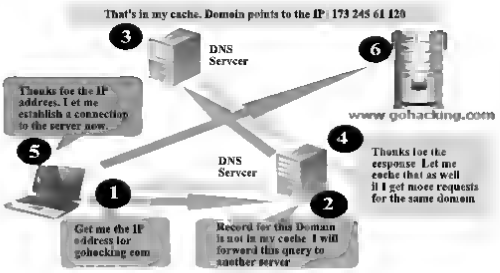

Figure 4.7– DNS

USEFUL TIP

Internet Services operate on the client/server model or concept. A computer is a client if it is receiving files, and is a server if it is sending files.

QUICK REVIEW

- Which is the best application for video chat service?
- How FTP helps us send a file?
- What are mobile centric chat applications?

4.8 Intranet

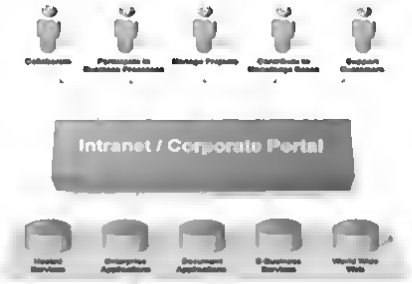

Figure 4.8– Intranet

An intranet is a private network, accessible only to an organization's staff. Generally a wide range of information and services from the organization's internal IT systems are available that would not be available to the public from the Internet.

An intranet's Web sites look and act just like any other Web sites, but the firewall surrounding an intranet fends off unauthorized access.

4.8.1 Internet versus Intranet

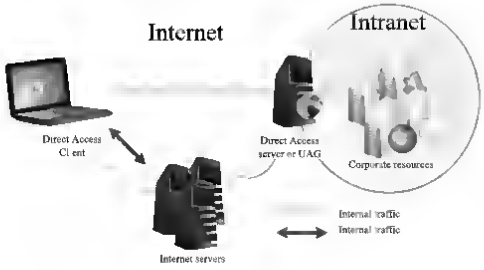

Figure 4.9– Internet

The Internet is the global World Wide Web, while an intranet is a private Internet operating within a company. Both the Internet and an intranet use TCP/IP protocol as well as features like e-mail and typical World Wide Web standards.

One main difference is that users of an intranet can get on the Internet, but thanks to protection measures like computer firewalls, global Internet users cannot get onto an intranet unless they have access to it. In fact, an intranet can be run without an Internet connection.

Internet is more general, spreads to a larger population, provides a better access to all web based services and thus, is pretty user friendly. Intranet is a far safer and secure privatized version of internet. Solely for the purpose of communication, intranet is an economic method to keep the organization's communication structured allowing quick data exchange round the clock all the year.

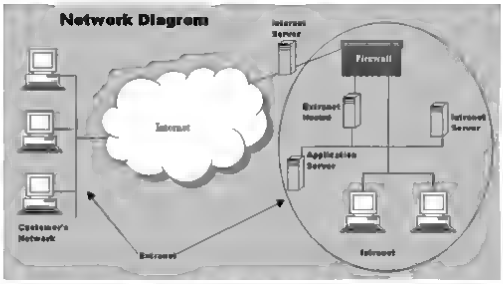

Figure 4.10– Internet vs. Intranet

QUICK REVIEW

- What are the differences between Internet & Intranet?
- Which is more secure – Internet or Intranet?

4.9 Connecting to Internet

4.9.1 Types of Internet Connection

Once you've set up your computer, you'll probably want to get Internet access so you can send and receive emails, browse the Web, watch movies, and can do much more. Before you can access the Internet, there are three things you need: **an Internet service, a modem, and a web browser.**

Here are some common types of Internet connection services:

Dial-up: Dial-up is generally the slowest type of Internet connection and mostly obsolete nowadays. Like a phone call, a dial-up modem will connect you to the Internet by dialing a number, and it will disconnect when you are done surfing the Web.

DSL: Digital Subscriber Line service uses a broadband connection, which makes it much faster than dial-up. DSL connects to the Internet via phone line but does not require you to have a land line at home. Unlike dial-up, it will always be ON once its set up, and you'll be able to use the Internet and your phone line simultaneously.

Cable: Cable service connects to the Internet via cable TV, although you do not necessarily need to have cable TV in order to get it. It uses a broadband connection and can be faster than both dial-up and DSL service; however, it is only available in places where cable TV is available.

Figure 4.11 – Connecting Internet

Satellite: A satellite connection uses broadband but does not require cable or phone lines; it connects to the Internet through satellites orbiting the Earth. As a result, it can be used almost anywhere in the world, but the connection may be affected by weather patterns. A satellite connection also relays data on a delay, so it is not the best option for people who use real-time applications, like gaming or video conferencing.

3G and 4G: 3G and 4G service is most commonly used with mobile phones and tablet computers, and it connects wirelessly through your ISP's network. If you have a device that's 3G or 4G enabled, you'll be able to use it to access the Internet away from home, even when there is no Wi-Fi connection.

4.9.1.1 Dial-up Connection

Dialup internet service is a service that allows connectivity to the internet through a standard telephone line. By connecting the telephone line to the modem in your computer and inserting the other end into the phone jack, and configuring the computer to dial a specific number provided by your internet service provider (ISP) you are able to access the internet on your computer

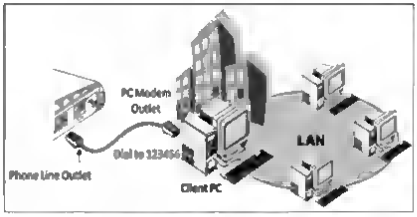

Figure 4.12 – Dial-up Connection

In order to get a dial up internet service a person must definitely have a computer and even more important a modem. There are different types of modems, and most of them are inexpensive to purchase. A telephone line is linked to the modem. The modem is controlled by software on the computer.

With dial up internet you cannot use the phone and search the web at the same time. It is because one end of the telephone is linked to the modem and the other end is in the phone outlet

4.9.1.2 Modem

A modem is a device or program that enables a computer to transmit data over, for example, telephone or cable lines. Computer information is stored digitally, whereas information transmitted over telephone lines is transmitted in the form of analog waves. A modem converts between these two forms. Modem is abbreviation for Modulator – Demodulator.

Figure 4.13 – Modem

A modem modulates outgoing digital signals from a computer or other digital device to analog signals for a conventional copper twisted pair telephone line and demodulates the incoming analog signal and converts it to a digital signal for the digital device. The modems are of various types.-

Internal Modem

Internal Modem is the device installed in the desktop or laptop computer to communicate over a network with other connected computers. These are cheaper than external modems as they do not require power supply or a chassis. There are two types of internal modems: dial-up and WiFi® (wireless). Dial up works on the telephone cables and requires a network access phone number and log on credentials to make a connection and WiFi modem comments to the network without filling these credentials

External Modem

External modems are the simplest type of the modem to install. The telephone line plugs into a socket on the rear panel of the modem. As external modems have their own power supply, you can turn off the modem quickly to break the connection. The examples of these modems are the DSL modems which are used in the broadband connections.

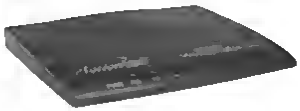

Figure 4.14– External Modem

PC Card Modem:

Figure 4.15– PC Card Modem

These modems, designed for portable computers, are the size of a credit card and fit into the PC Card slot on notebook and handheld computers. These modems are removed when the modem is not needed. Except for their size, PC Card modems are like a combination of external and internal modems. These devices are plugged directly into an external slot in the portable computer. So no cable is required other than the telephone line connection. The cards are powered by the computer, which is fine unless the computer is battery-operated.

4.9.1.3 DSL Digital Subscriber Line

Digital subscriber line (DSL; originally digital subscriber loop) is a family of technologies that are used to transmit digital data over telephone lines. DSL (Digital Subscriber Line) is a technology for bringing high- bandwidth information to homes and small businesses over ordinary copper telephone lines.

In telecommunications marketing, the term DSL is widely understood to mean asymmetric digital subscriber line (ADSL), the most commonly installed DSL technology, for Internet access. DSL service can be delivered simultaneously with wired telephone service on the same telephone line. This is possible because DSL uses higher frequency bands for data. On the customer premises, a DSL filter on each non-DSL outlet blocks any high-frequency interference to enable simultaneous use of the voice and DSL services. The bit rate of consumer DSL services typically

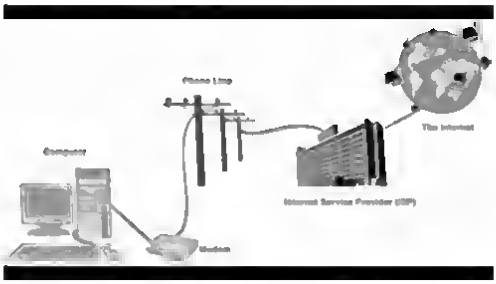

Figure 4.16 – Connecting Internet

ranges from 256 Kbit/s to over 100 Mbit/s in the direction to the customer (downstream), depending on DSL technology, line conditions, and service-level implementation.

Digital Subscriber Line is a technology that assumes digital data does not require change into analog form and back. Digital data is transmitted to your computer directly as digital data and this allows the phone company to use a much wider bandwidth for transmitting it to you. Meanwhile, if you choose, the signal can be separated so that some of the bandwidth is used to transmit an analog signal so that you can use your telephone and computer on the same line and at the same time.

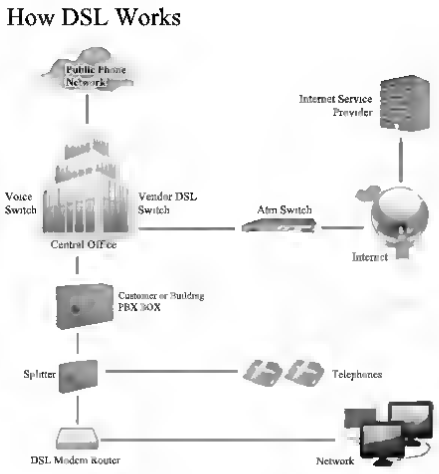

Figure 4.17 – DSL Working

4.9.1.4 Cable Modem

A cable modem is a type of Network Bridge and modem that provides bi-directional data communication via radio frequency channels on a hybrid fiber-coaxial (HFC) and Radio frequency infrastructure. Cable modems are primarily used to deliver broadband Internet access in the form of cable Internet, taking advantage of the high bandwidth network.

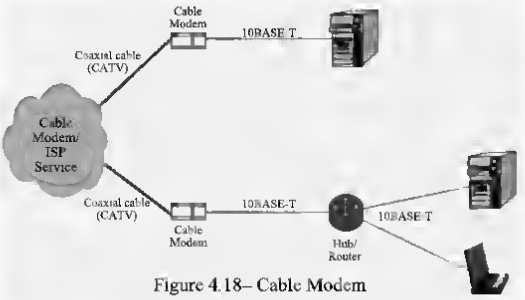

Figure 4.18– Cable Modem

A cable modem is a device that enables you to hook up your PC to a local cable TV line and receive data at about 1.5 Mbps. This data rate far exceeds that of the prevalent 28.8 and 56 Kbps telephone modems and the up to 128 Kbps of Integrated Services Digital Network (ISDN) and is about the data rate available to subscribers of Digital Subscriber Line (DSL) telephone service. A cable modem can be added to or integrated with a set-top box that provides your TV set with channels for Internet access. In most cases, cable modems are furnished as part of the cable access service and are not purchased directly and installed by the subscriber.

In addition to the faster data rate, an advantage of cable over telephone Internet access is that it is a continuous connection

4.9.1.5 ISDN (Integrated Service Digital Network)

Integrated Services for Digital Network (ISDN) is a set of communication standards for simultaneous digital transmission of voice, video, data, and other network services over the traditional circuits of the public switched telephone network.

The key feature of ISDN is that it integrates speech and data on the same lines, adding features that were not available in the classic telephone system

ISDN is a circuit switched telephone network system, which also provides access to packet switched networks, designed to allow digital transmission of voice and data over ordinary telephone copper wires, resulting in potentially better voice quality than an analog phone can provide.

Integrated services refer to ISDN's ability to deliver at minimum two simultaneous connections, in any combination of data, voice, video, and fax, over a single line. Multiple devices can be attached to the line, and used as needed. That means an ISDN line can take care of most people's complete communications needs (apart from broadband Internet access and entertainment television) at a much higher transmission rate, without forcing the purchase of multiple analog phone lines.

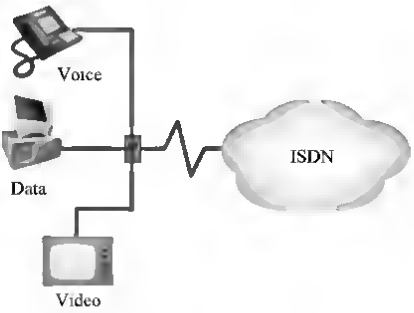

Figure 4.19– ISDN

4.9.2 Network / Internet Devices

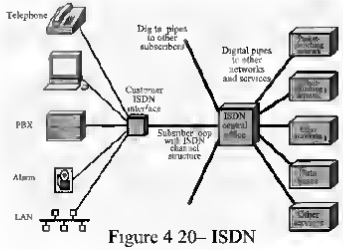

Figure 4.20– ISDN

A computer network or data network is a network which allows computers to exchange data. In computer networks, networked computing devices exchange data with each other along network links (data connections). The connections between nodes are established using either cable media or wireless media. The best-known computer network is the Internet.

Networks are used to:

1. Facilitate communication via email, video conferencing, instant messaging, etc.

2. Enable multiple users to share a single hardware device like a printer or scanner
3. Enable file sharing across the network
4. Allow for the sharing of software or operating programs on remote systems
5. Make information easier to access and maintain among network users

4.9.2.1 Network Devices

An Internet device is a tool whose main function is easy access to Internet services such as WWW or e-mail. A variety of devices are used to connect network of a computer. The most common devices are given below:

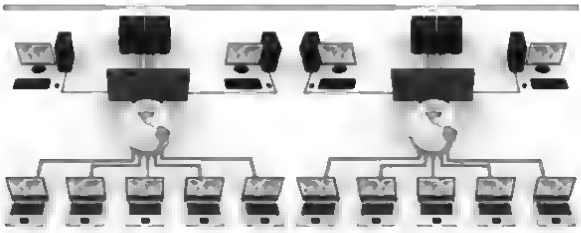

Figure 4.21 – Computer Network

4.9.2.1.1 Hub

A hub is a common connection point for devices in a network. Hubs are commonly used to connect segments of a LAN. A hub contains multiple ports. When a packet arrives at one port, it is copied to the other ports so that all segments of the LAN can see all packets.

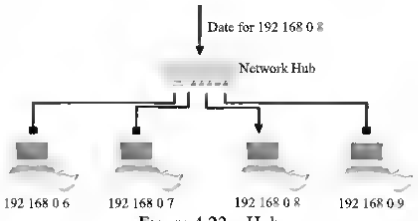

Figure 4.22 – Hub

Typically, a network hub is used for a private network, one that does not have any connections to sources other than local computers (meaning, no Internet access). Additionally, network bandwidth is split between all of the connected computers. So, more the computer that is connected, the less bandwidth that is available for each computer, which means slower connection, speeds.

4.9.2.1.2 Switch

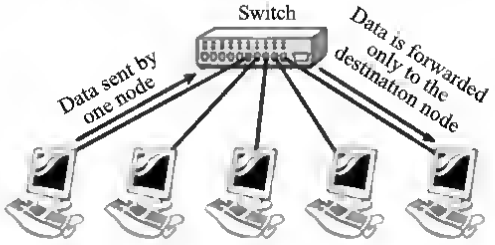

Figure 4.23 – Switch

A network switch (also called switching hub, bridging hub) is a computer networking device that connects devices together on a computer network, by using packet switching to receive, process and forward data to the destination device. Unlike network

hubs, a network switch which is more advanced than hub forwards data only to one or multiple devices that need to receive it, rather than broadcasting the same data out of each of its ports

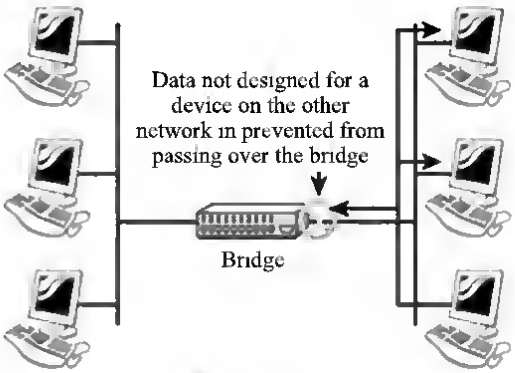

Figure 4.24 – Bridge

4.9.2.1.3 Bridge

A bridge is used to join two network segments together, it allows computers on either segment to access resources on the other They can also be used to divide large networks into smaller segments

4.9.2.1.4 Router

Figure 4 25 – Router

A network router is quite different from a switch or hub since its primary function is to route data packets to other networks, instead of just the local computers. A router is quite common to find in homes and businesses since it allows your network to communicate with other networks including the Internet

Routers perform the "traffic directing" functions on the Internet. A data packet is typically forwarded from one router to another through the networks that constitute the internetwork until it reaches its destination node.

Routing Table

Routers contain internal tables of information called routing tables that keep track of all known network addresses and possible paths throughout the internetwork, along with cost of reaching each network. Routers route packets based on the available paths and their costs, thus taking advantage of redundant paths that can exist in a mesh topology network. The routing tables are the heart of a router, without them, there's no way for the router to know where to send the packets it receives

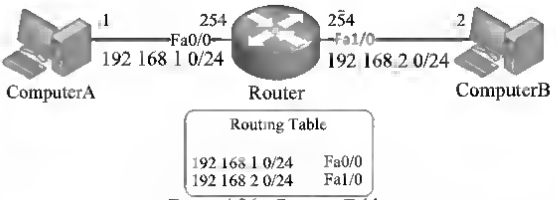

Figure 4 26 – Routing Table

A basic routing table includes the following information:

- Destination: The IP address of the packet's final destination
- Next hop: The IP address to which the packet is forwarded
- Interface: The outgoing network interface the device should use when forwarding the packet to the next hop or final destination
- Metric: Assigns a cost to each available route so that the most cost-effective path can be chosen
- Routes: Includes directly-attached subnets, indirect subnets that are not attached to the device but can be accessed through one or more hops, and default routes to use for certain types of traffic or when information is lacking.

4.9.2.1.5 Gateway

A network gateway is an internetworking system capable of joining together two networks that use different base protocols. A network gateway can be implemented completely in software, completely in hardware, or as a combination of both.

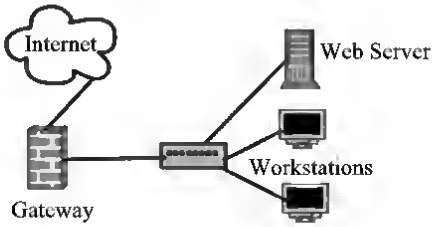

Figure 4.27 – Gateway

A gateway is one of the many ways our data is moved over the Web for us. The gateway gives us entry into different networks so we can send email, look at Web pages, buy things online, and more. You can easily say that gateways deliver the freedom, information and convenience we enjoy online.

USEFUL TIP

Most common use of Gateways is seen in e-commerce where Banks use a secure Payment Gateway for transacting payments.

QUICK REVIEW

- What is the difference between Huh & Switch?
- What is the difference between Bridge & Router?

Multiple Choice Questions

1. Key uses of Internet are .....
   a. Communication
   b. Education
   c. Financial Transaction
   d. all of the above

2. Before an user can access the Internet, which of the following is required?
   a. Internet service b. Modem
   c. Web browser d. All of the above

3. ISP stands for
   a. Internet service provider
   b. Intranet service provider
   c. Information service provider
   d. None of the above

4. Web browser is a .....
   a. System Software
   b. Application Software
   c. A and B
   d. None of the above

5. DSL stands for
   a. Dynamic subscriber line
   b. Digital subscriber line
   c. A and B
   d. None of the above

6. URL stands for
   a. Uniform Resource Locator
   b. Universal Resource Locator
   c. A and B
   d. None of the above

7. WWW Stands for
   a. World Wisdom Web
   b. World Wide Web
   c. World Web of Wisdom
   d. Wide Web of Word

8. 'com' represent in this URL: 'http://www.google.com/index.html'
   a. Domain b. Sub Domain
   c. Protocol d. Top level domain

9. Which is not example of chat application?
   a. Skype
   b. Google Hang Outs
   c. Facebook
   d. None of the above

10. FTP stands for
    a. Folder Transfer Protocol
    b. File Transfer Protocol
    c. A and B
    d. None of the above